Proposal for Acquiring Zero-offset Vertical Seismic Profile in SOH, Hawaii

by
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Total Amount Requested: $ 25,534

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We proposed to acquire a single zero-offset Vertical Seismic Profile (VSP) in one of the Scientific Observation Holes (SOH's) on the island of Hawaii. The objective of the VSP is to define the P-wave velocity structure around the hole and to test the applicability of the VSP technique in an SOH.

Knowledge of the P-wave velocity structure near the SOH's is critical for locating local earthquakes. The depth and lateral positions of the local earthquakes can be accurately determined only if the near-surface velocity structure is known in sufficient detail. A zero-offset VSP would also provide information on seismic wave propagation and attenuation and would demonstrate whether or not it would be feasible to run multi-offset VSP's in the future. Multi-offset VSP's are generally valuable for defining fracture orientations and densities. If this zero-offset VSP is successful, we would plan to run multi-offset VSP's in one or more SOH's.

A zero-offset VSP would require about two days of time, during which we would deploy a seismometer down a hole and shoot an airgun at the surface. We plan to use a high-temperature VSP tool and a winch with 2,000 ft of 7-conductor wire from the borehole research group at the University of Southern California. The tool would be lowered to a depth of 2,000 ft and clamped to the side of the hole. We would then shoot an airgun in a pit at the surface near the hole and record the energy received by the VSP tool. Five to ten shots would be recorded at each level and would later be added together to enhance the signal to noise ratio. We would shoot and record at about 100 locations, each separated vertically by 20 feet. Processing of the VSP data would be carried out at SOEST.

The planning, acquisition and processing phases of the experiment will be carried out by G. Moore and G. Fryer. We estimate that the work will require about one month each of our time, of which we are asking for half from the State. The airgun will be operated by Luigi Pozzi of SOEST, who will spend about one-half month preparing and shipping equipment, operating the equipment and handling logistics on Hawaii. The VSP tool, wire and winch will be borrowed from USC; we must reimburse USC for the cost of preparing the equipment, shipping it to and from Hilo and for refurbishing it after its use. The USC equipment will be operated by a technician from USC; we must pay his salary for one week.

BUDGET

Budget Category	Request
A. SENIOR PERSONNEL	
1. G. Moore, 0.5 mo	$ 3,596
2. G. Fryer, 0.5 mo	2,732
TOTAL SENIOR PERSONNEL	6,328
B. OTHER PERSONNEL	
1. L. Pozzi, Technician, 0.5 mo	2,050
TOTAL OTHER PERSONNEL	2,050
TOTAL SALARIES AND WAGES	8,378
C. FRINGE BENEFITS @ 26%	2,178
TOTAL SALARIES, WAGES AND BENEFITS	10,556
D. TRAVEL	
3 RT Honolulu - Hilo	240
7 days' per diem each @ $80/day	1,680
Ground transportation	200
TOTAL TRAVEL	2,120
E. OTHER DIRECT COSTS	
1. Materials and supplies	
a. Recorder supplies	250
b. Computer tapes	250
Total Materials and Supplies	500
2. Computer Services	
a. Sun SPARCstation	1,250
Total Computer Services	1,250
3. Subcontract to Univ. So. California	
a. VSP Technician, 1 week	1,750

b. 1 RT Los Angeles - Hilo plus 7 days' per diem @ $135/day	1,495
c. Use of VSP tool, wire, winch	1,500
d. Shipping VSP tool and winch LA - Hilo and return	2,500
Total Subcontract to USC	7,245
4. Other	
a. Communications	750
b. Use of airgun and recording system	1,000
c. Rental of air compressor	1,250
d. Shipping airgun Honolulu - Hilo and return	300
e. Misc. costs for preparing pit for firing airgun	1,500
Total Other Costs	3,000
TOTAL OTHER DIRECT COSTS	11,995
F. TOTAL DIRECT COSTS	24,671
G. INDIRECT COSTS	
3.5% of TDC	863
H. TOTAL DIRECT AND INDIRECT COSTS	$25,534